CHARLES UNIVERSITY IN PRAGUE
FACULTY OF PHYSICAL EDUCATION AND SPORTS

Case Study of Physiotherapy Treatment of a Patient with the Diagnose Psoriatic Arthritis and Total Knee Replacement

Bachelor's thesis

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Abstract

Title:

EN: Case study of physiotherapy treatment of a patient with the diagnose psoriatic arthritis and total knee replacement

CZ: Kazuistika fyzioterapeuticke léčby pacienta s diagnózu psoriatic arthritis a totální endoproteza kolenniho kloubu

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Summary

The objective of this thesis is to illustrate a case study of a patient with the diagnosis psoriatic arthritis and physiotherapy after a total knee replacement. It is discussed in two parts, one theoretical that will focus on anatomy, kinesiology, and biomechanics of the knee, and also focus on the psoriatic arthritis and osteoarthritis of the knee.. The second part, the special part, of the thesis will focus on the patients rehabilitation, describing the examination, the day to day therapy, the final examinations and conclusion.

Keywords:

Psoriatic arthritis, total knee replacement, osteoarthritis physiotherapy, rehabilitation.

Declaration

I hereby declare that this bachelor thesis work is entirely my own, individual work on knowledge from books, articles, journals and by attending seminars and lectures at FTVS.

I also declare that no invasive methods were used during the practical approach and that the patient was fully aware of the procedures at any given time.

Prague, 2015

Acknowledgement

I would like to thank my girlfriend for supporting me throughout the whole study program here in Prague. She has been motivating and helping me through this three years. My family for supporting me the whole time to study abroad. And my friends has also influenced me in a positive way, by helping, giving advices and supporting me.

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Tor-Erik W. Stiksrud
Prague, 2015

1. Introduction

This thesis concerns theoretical and practical aspect of the diagnosis psoriatic arthritis with a total knee replacement. Psoriatic arthritis is a type of arthritis that affects some people that have psoriasis. Psoriasis is a skin disease that gives the skin red, scaly and itchy patches. Arthritis is inflammation of joints and most often psoriasis develops first and then the patient is diagnosed with psoriatic arthritis afterwards. Joint pain, swellings and stiffness are the main symptoms of psoriatic arthritis. It can affect any part of the body and can vary from mild to severe and it can have periods with remission. Medication and exercise either at home or with a physical therapist is provided until a total knee replacement is considered, that is when the joint is to painful and dysfunctional to do activities of daily living. For a diagnosis to be made of the knee, there should be provided an X-ray. A total knee replacement should be the last choice when no other treatment or therapy works, because of the risk of complications.

The bachelor thesis is divided into two parts: a general part and a special part. In the general part, theory about the psoriatic arthritis is described, as well as the knee and the total knee replacement. It is divided into different topics as for the knees anatomy, kinesiology and biomechanics, the diseases characteristics, epidemiology and signs and symptoms. Total knee replacement is described with clinical presentation, indications and contraindications and physiotherapy.
The general part is meant as a brief overview of the diagnosis, the knee and the total knee replacement.

The special part is supposed to be the main focus. Here the examination and therapy progression of the given patient is described. A full examination and therapy implantation with conclusions of both initial and final examinations, described performed day to day therapy and evaluation of the effect of the therapy and the results. This is performed using knowledge from the whole physiotherapy study program at Revmatologický ústav clinic in Prague in cooperation with advisor and supervisor. The thesis includes a list of used literature, tables of abbreviations is listed in the supplement, also including the application to the ethics board.

2. General part

2.1 Anatomy and kinesiology of the knee

2.1.1 Anatomy

The knee joint is the largest and one of the strongest, most complex and most superficial joints in the body. The joint is made up of two articulations; the tibiofemoral joint and the patellofemoral joint. The knee joint is a synovial hinge joint knee joint which means it primarily provides flexion and extension, but recent studies shows that there is slight internal and external rotation as well. The knee is made up of the lower end of the femur, the upper end of tibia and the patella. The end of the femur, the lateral and medial epicondyles of the distal part which is convex meets the concave condyles of the proximal part of the tibia.

In the place they connect there is articular cartilage which covers and enables the knee to move smoothly. The cartilage is there to minimize the pressure and friction as you move.

The knee joint also consists of tendons, that connects muscles to the bones and ligaments that connects the bones and provide stability.

The ligaments connecting the femur, tibia and patella is the anterior cruciate ligament, the posterior cruciate ligament, the medial and lateral collateral ligaments, the lateral and medial meniscus. (Drake, 2009)

The anterior cruciate ligament (ACL):

The ACL is made up of fibers of connective tissue that goes from the femur to the tibia. Its function is to resist anterior tibial translation and rotational loadings. Starting from the lateral femoral condyle, its fibers fan out to the tibial attachment which is anterior to the intercondyloid eminence of the tibia, there it blends together with the anterior part of the medial meniscus. The tibial attachment is stronger than the attachment at femur because of the difference in size, it is as much as 120% larger than the femoral attachment. The ACL provides almost all of the total restraining force anterior translation. It also make sure the tibia dose not rotated excessively medially and laterally and it prevents to much varus and valgus stresses. (Moore, 2013) (Siebold, 2014)

The posterior cruciate ligament (PCL):

The posterior cruciate ligament is the largest of the interarticular ligaments almost double the strength and twice as thick as the anterior cruciate ligament. It originates from the lateral aspect of medial femoral condyle to the posterior fossa. The origin is much more anterior than that of the

ACL. The insertion is where it got its name from, on the posterior between the two tibial plateasus, the so-called posterior intercondyloid fossa, or PCL fossa. The length of the
The PCL is important for the knee joints stability, to prevent posterior translation of the tibia on the femur. It also plays an role in controlling rotational motions in the knee. (Fanelli, 2015)

The collateral ligaments

These ligaments stabilize the knee joint in the coronal plane.
The medial collateral ligament (MCL)
This is the wider of the two collateral ligaments and connects the femur to the tibia. This ligament runs anteriorly and distally from the medial epicondyle of the femur in an oblique direction, ending 7-8 cm below the tibial plataou, on the medial surface of the tibia. (Schunke, 2005)

The lateral collateral ligament (LCL)

Also known as the fibular collateral ligament. It is a round straight cord like ligament that runs from the lateral epicondyle of femur obliquely distally and posteriorly to the fibular head.
Both ligaments are pulled tight when the knee is in extension. When the knee flexes the insertion and origin of the two ligaments moves closer to each other because the radius of the curve is decreased. In this position the ligaments relax. The medial collateral ligament is more frequently injured. The reasons for this is its relationship to the joint capsule and the medial meniscus which its firmly attached to, this will make the ligament less mobile and therefor more exposed for injuries. The lateral collateral ligament does not have contact with the capsule or the lateral meniscus so its able to move more freely. (Schunke, 2005)

The meniscus

The medial and lateral meniscus consists of two anterior horns and two posterior horns. They are both cresent-shaped when viewed from above. The horns is attached with short ligaments to the tibia, specifically on the anterior and posterior intercondylars. The medial meniscus forms a half circle and is less mobile than the lateral because the points of attachment is longer spread apart from each other and it is also attached to the medial collateral ligament as mentioned above which makes it even less mobile. The lateral meniscus almost forms a complete circle and is more mobile than the medial. Also, its not attached to the lateral collateral ligament which gives it more mobility.
The structure of the meniscus is a wedge shaped cross section. The base of the wedge being directed towards the periphery and attached to the joint capsule. The part of the meniscus facing the tibial plataou is flat, while the upper part facing the femur is concave. The central inner two thirds

of the meniscus is made out of fibrocartilage and the outer third strong connective tissue. (Schunke, 2005)

The joint capsule

Includes the patella, ligaments, brusae and the meniscus. The joint capsule is inseparable from the ligaments and aponeuroses apposed to it. It consists of an external fibrous layer on the capsule and an internal synovial membrane that lines all internal surfaces of the articular cavity not covered with articular cartilage. From posterior view, the vertical fibers arises from the tibial and femoral condyles. The intercondylar fossa of the femur are covered by the oblique popliteal ligament. The capsule attaches to the tibial condyles and the borders of the meniscus inferiorly. External ligaments that strengthen and supports the capsule are the tensor fascia latae and the iliotibial tract, the lateral and the medial patellar retinacula, and the arucate popliteal, oblique popliteal and patellar ligaments. The quadriceps tendon, patella and patellar ligament replace the fibrous layer anteriorly. (Moore, 2013)

Muscles of the knee joint

Flexors

Quadriceps femoris: Consists of 4 muscles; the rectus femoris, vastus medialis, vastus lateralis and vastus intermedius

Rectus femoris:

Origin: Anterior inferior iliac spine

Insertion: Common tendon of the quadriceps enclosing the patella and inserting on the tibial tuberosity

Innervation: Femoral nerve (L02-L04)

Vastus medialis:

Origin: Intertrochantic line and medial lip of linea aspera

Insertion: Patella via the quadriceps tendon; tibial tuberosity via the patellar ligament

Innervation: Femoral nerve (L02-L04)

Vastus lateralis:

Origin: Trochanter major

Insertion: Patella via the quadriceps tendon
Innervation: Femoral nerve (L02-L04)

Vastus intermedius:
Origin: Upper two-thirds of the anterior and lateral surface of the femur
Insertion: Quadriceps tendon
Innervation: Femoral nerve (L02-L04)

Sartorius:
Origin: Anterior superior liliac spine
Insertion: Medial surface of the superior shaft of the tibia via common tendon of pes anserinus
Innervation: Femoral nerve (L02, L03)

Popliteus:
Origin: Lateral condyle of femur
Insertion: Posterior surface of proximal shaft of tibia
Innervation: Tibial nerve (L4-S01)

Extensors:
Hamstrings: Consists of 3 muscles; the Biceps femoris, semitendinotus and semimembranosus.
Biceps femoris:
Long head:
Origin: Ischial tuberosity
Insertion: Head of fibula
Innervation: Tibial nerve (S01-S03)

Short head:
Origin: Linea aspera of femur
Insertion: Head of fibula
Innervation: Common fibular (peroneal) nerve (L05, S01, S02)

Semitendinotus:
Origin: Ischial tuberosity
Insertion: Medial surface of the superior shaft of the tibia, common tendon of the pes anserinus

Innervation: Tibial nerve (L05-S02)

Semimembranosus:
Origin: Ischial tuberosity
Insertion: Medial condyle of tibia
Innervation: Tibial nerve (L05-S02)
(Drake, 2009)

Bursae:

Bursae is a fluid filled sac or sac-like cavity, especially one countering friction at a joint.
There is plenty of bursae around the knee joint, but those that are in direct contact with the knee joint include the semimembranosus bursae, the medial subtendinosus bursae, supra patellar bursae, sub popliteal recess (Maeurer, 2006)

Blood supply:

The blood supply to the knee comes from five major arteries; the superior lateral, superior medial, inferior lateral, inferior medial, and the posterior genicular artery. These arteries are branches from the femoral and the popliteal artery and surrounds the entire knee. (Moore, 2013)

Innervation:

The innervations of the knee joint comes from branches of the obturator, sciatic and femoral nerve. There is an anterior group which includes the femoral, common peroneal and the saphenous nerves. And then there is the posterior group, that includes the tibial nerve. (Moore, 2013)

2.1.2 Kinesiology:

The knee joint is a hinge joint because it does the movements flexion and extension, but it can also rotated, which makes it a modified hinge joint.
The rotation is small, and only occur when the knee is flexed. The active range of motion in flexion of the knee varies whether the hip is flexed or not, the flexion goes up from 120° to 140° when the hip is flexed, and the passive is 160°. Extension in knee is 0°.
Medial rotation is 10° when the knee is flexed, and 5° when its extended. Lateral rotation is 30°.

The flexion and extension motions happens in the sagittal plane between the condyles of the femur and tibia. The femoral condyles glide over the tibial condyles. This gliding motion is necessary to hold the femur positioned over the tibial condyles. When the knee is maximal extended the knee passively locks. This makes the lower extremity a solid column which makes the thigh muscles relax briefly, without making the leg too unstable. The popliteus muscle contracts for the knee to start unlocking and flexing. When this happens, the femur laterally rotates around 5°.
When the knee is flexed, rotation can happen with the control and help from the anterior and the posterior cruciate ligaments. If you rotate your leg medially the cruciate ligaments will twist around each other, and in lateral rotation they become wound up. The lateral rotation is bigger than the medial and it is determined by the tibial collateral ligament.
The patellas motion in the patellofemoral joint in flexion and extension is inferiorly and superiorly on the distal part of the femur and is the motion is up to approximately 7 cm. Tracking of the patella against the femur depends on the net force produced by the quadriceps muscle.
The vastus lateralis pulls the patella laterally and the vastus medialis opposes this pull in the medial direction, this makes the patella lie in the patellofemoral groove. These medial and lateral forces also tilt the patella in the transverse and sagittal planes. Other things that influence the position of the patella is the iliotibial band, it can create excessive tightness and cause maltracking of the patella (Moore, 2013) (Clippinger, 2007)

2.2 Biomechanics of the knee

2.2.1 Forces of the patellofemoral joint

The patellofemoral joint is a complex joint with interplay of several components, including the patella, the trochlea of the femur, the soft tissues and the quadriceps femoris. Other factors that can effect the patellofemorals mechanics is angular and rotational limb alignment. During flexion of the knee, the contact point is not uniform through the whole flexion. As the knee flexes, the patella engages within the trochlea and the contact area increases and moves upwards. The load bearing starts at the most distal patellar surface and progresses proximally until it reaches the maximum at 80-90 degrees of flexion. As patellofemoral reaction force increases, so does the contact area. This results in modulating stress. Around 50-90 degrees of flexion the quadriceps femoris tendon starts turning around the femoral trochlea and shares the load with the patella. The patella encounters from 0,5-9,7 times the total body weight when doing different types of daily acitvites. When walking, the patellofemoral joint experience approximately one half of the body weight in compressive force. This compressive force can increase up to three times the body weight when walking up stairs. (Andrish, 2015)

2.2.2 Forces of the tibiofemoral joint

The medial tibial plateau is much bigger than the lateral, as much as 60 % bigger and three times thicker, so the medial plateau bears the most of the load during walking and especially when the knee is maximum extended, it also makes it more helpful for the joint from wearing. The lateral plateau bears most of the much lesser weight when the leg is in its swing phase. The forces acting upon the tibiofemoral joint is compressive and shear, and during walking the compressive load can be up to three times the body weight during stance phase, and up to four times when walking up stairs. The meniscus helps to distribute weight and load on the knee on a wide area, its main task is to minimize the amount of joint stress to the knee and to assist absorbing forces acting on the knee, as much as 50% of the load is absorbed into the meniscus from 0 - 90 degrees flexion (Johnson, 2007)

2.3. Osteoarthritis of knee

2.3.1 Characteristics

Osteoarthritis is a chronic condition which can cause stiffness, pain and swelling in joints. It is a general inflammation of a joint that includes the soft tissues around. The inflammation can be a result of trauma, but also as of bone and joint infections. Osteoarthritis is a so-called degenerative joint disease. It is the most common type of arthritis and it is characterized by deconstruction of the articular cartilage in a joint and formation of adjacent bone. The disease occurs most often in the load-bearing joints of the body, especially the spine, the hips and the knees. (White, 2011)

2.3.2 Epidemology

Osteoarthritis is the most common joint disease in adults worldwide. One-third of all adults have signs and symptoms for osteoarthritis. Osteoarthritis in the knee joint is the most common type and the chances for developing it increases with aging, its an inherent part of the aging process (Rahim, 2011).

2.3.3 Etiology

The exact cause of osteoarthritis is not known and is discussed topic, but it is suggested to be related to aging, but metabolic, genetics, chemical and mechanical factors can also result in osteoarthritis. It mostly occurs in the knees after trauma, injury or infection. The disease could be primary (idiopathic), or secondary. Primary osteoarthritis etiology is suggested to be age, sex and

heredity and also a persons biomechanics alignment and obesity (especially in woman) can be factors that leads to osteoarthritis. Secondary on the other hand is thought to be connected to metabolic, anatomic, traumatic or inflammatory causes. Even though secondary osteoarthritis has an underlying cause, pathologically it is difficult to distinguish it from primary osteoarthritis. The reason for this is because the symptoms and clinical presentation is very similar.
(Mckeon, 2011) (Rahim, 2011)

2.3.4 Signs and symptoms

The signs and symptoms for osteoarthritis is stiffness, often in the morning and is localized in the affected joint. Limited joint function and range of motion can be experienced by patients, which could be because of joint swelling, but also because of joint pain, which is another sign of osteoarthritis. The joint pain is most often present with weight-bearing, when standing up and walking. When resting the pain should be relieved, but as the disease progresses the pain could be present also at rest. Bony enlargement with tenderness when palpating the joint is common when examining the joint. Quadriceps atrophy might also be an indicator for osteoarthritis, this is determined with palpation or circumference around the thigh. Patients might be limping when having knee osteoarthritis, the gait will be slow and with decreased extension of the knee in both the swing and stance phase. (Moskowitz, 2007)

2.4 Psoriatic arthritis

2.4.1 Epidemology

Estimation states that there is 6.6/100 000 incidents per year of psoriatic arthritis, but epidemiological researches has been difficult, because of the diverse clinical manifestations of the condition. The diagnosis can easily be missed or overlooked. There is no strong connection with the severety of psoriasis and development of arthritis, even though psoriatic arthritis may be present much more in patients with psoriasis attending dermatology clinics, compared to primary care. (Ritchlin, 2007)

2.4.2 Characteristics

Arthritis is a general inflammation of a joint. It can happen in any joint and includes soft tissues. The inflammation can come as a bone joint infection and also as a result of trauma.
Psoriasis is an autoimmune skin disease with marked red, itchy, scaly patches on the ski. Typically located around the knees, elbows and the scalp. Psoriasis can be connected to other diseases like diabetes 2, heart disease and depression.

The psoriasis can as mentioned occur in the face, more specific around the eyebrows, under the nose, in the forehead at the hair line. On the scalp it can be very thin and mild, but it can also be thick with crusted plaques covering the whole scalp around to the neck and to ears.
It can also occur on hands, nails and feet. in over 80 % of the cases of psoriatic arthritis the nails is affected, and around 50 % of those who have psoriasis.
Psoriasis have different types; Plaque psoriasis, which is the most common type. Raised, red patches covered with a silvery white build up of dead skin cells. They are itchy and painful and can crack open and start bleeding. This is the type that mostly occur around the knees, the lower back, elbows and the scalp.
The next type is Guttate. These are small red dots lesions on the skin. It often occurs during childhood or early adulthood. The Guttate type happens in approximately 10 % of the patients that have psoriasis and is the second most common type of psoriasis.
Inverse is red lesions in body folds often behind the knees, under the arm or the around the groin. It appears smooth and shiny on the skin.
Erythrodermic psoriasis is a severe type of psoriasis that leads to big spreading. It can be very itchy and painful and make the skin fall off in sheets. This type of psoriasis is life threatening and very rare, only happening in 3 % of patients with psoriasis.
Last type is called Pustular and is white blisters of noninfectious pus surrounded by red skin. It can occur on any part of the body.
Psoriatic arthritis is inflammation in the joints, because the body´s immune system attacks them. It can develop from psoriasis, but it can also occur with people without psoriasis, mostly those with relatives that has psoriasis. It is chronic arthritis and can attack all joints, but mostly sacroiliac joint, knees, and distal joints of toes and fingers. (Richtlin, 2007)

2.4.3 Etiology

The cause of psoriatic arthritis is not known. Genetics is suggested to have an influence, with up to 40 % of patients with psoriatic arthritis have a family member with psoriasis or arthritis. It can also result from an infection that activates the immune system. Psoriasis can not infect, but it can be triggered by streptococcal throat infection. (Richtlin, 2007)

2.4.4 Signs and symptoms

The symptoms of psoriatic arthritis can occur in periods, they can improve and get worse, and they can go into remission. It can affect joints on one side of the body or both and mostly the distal joints. The signs and symptoms of psoriatic arthritis is similar to those of rheumatoid arthritis;

swollen and painful joints. Attachments of tendons and ligaments can also be painful. Patients with psoriatic arthritis can also develop spondylitis, and therefor low back pain, because of the inflammation in the vertebraes and the sacroiliac joint. other signs can be aortic valve disease, iritis, colitis, urethritis, and mouth ulcers. (Lescher, 2011)

2.5. Total knee replacement

2.5.1. Introduction

Total knee replacement, also knows as total knee arthroplasty (meaning: plastic surgery of joints) A total knee replacement is the last resort for a knee arthritis, after no other conservative therapy works. Over the years the results from total knee replacement has shown to be improved to be more reliable and successful. Therefor more patients choose the surgery option instead of osteotomy.
The surgery will replace the damaged knee with an implant (artificial device). The implant can be of many different types, including metal alloys, ceramic material and strong plastic. They will join with the bones with acrylic cement. A total knee replacement will help the patient with the activities of daily living because of the relieving of pain and increased mobility. (Brugioni, 2004)

2.5.2 Indications

The indications for total knee replacements is when a patient has major knee pain and decreased mobility as a result of an traumatic injury, osteoarthritis or arthritis. The doctor will perform x-ray, and it must shown enough arthritis for it to be consider as a potential total knee replacement. enough arthritis usually means that the bones are touching or almost touching each other. (Brugioni, 2004)

2.5.3 Contraindications

Active sepsis (infection) is an absolute contraindication for total knee replacement. If a prothesis is inserted into an already infected knee almost guarantees an increase of the inflammation.
If the patient has had prior infection this will only be a relative contraindication. Absent quadriceps femoris function is also a contraindication. Obesity can also be a contraindication, these patients are more at risk for peri-operative anesthesia and vascular problems, intra-operative technical problems and post operative prosthetic loosening. (Laskin, 1991)

2.5.4 Clinical presentation

The clinical history of a patient with knee arthritis is pain, either diffused or localized due to weight bearing, and after some time also constantly even while resting and it can be difficult sleeping because it can also occur during night time. The level of how much activities of daily living is affected by the pain, swelling, stiffness and weakness should be evaluated. Questions about walking distance and speed, stair climbing, sitting up, and walking aids and other activities of daily living should be answered. When the surgeon perform a total knee replacement, the first thing is to make an incision, about 15 cm long from the middle of femurs shaft down to the tibial tubercle, then the surgeon will remove aside all the muscles and ligaments, and also the patella to access the joint. The surgeon will now remove damage bone and cartilage from the distal femur (the condyles) and from the proximal tibia (tibial plataou) and also from the patella, so that the new artificial prosthetic parts can be placed. When they all are prepared, the surgeon will cement the parts into position. Followed by an x-ray to check that the parts is in the right position, and then the incision will be closed with staples or stitches. The treatment of the physiotherapist should focus on all the layers of the knee; the muscles, fascias, subcutaneous and most superficial, the skin. The focus should be on making the patient return to normal daily activities again as quickly as possible. Reducing pain, swelling and increase range of motion to make the patient functional is the most important. (Palmer, 2008)

2.6. Current therapeutic approaches

The main goals of the physiotherapeutic approaches post operation is to decrease pain and improve functionality. Other goals post operation is to avoid secondary changes and to take care of the structural components of the knee. Exercising should start immediately after the operation. Cryotherapy for decreasing pain. Soft tissue techniques for mobility and flexibility. Post isometric relaxation for relaxing muscles. Analgesics and anticoagulants are used for relieving pain, decreasing edema and muscle tension. (Palmer, 2008)

2.6.1 Physiotherapy

Treatment after total knee replacement should include the following; strengthening of weakened muscles, relax tense muscles with post isometric relaxation, cryotherapy, soft tissue techniques and passive and active motions. It is important to strengthen the weak muscles around the operated knee, and to relax those muscles that is tight to avoid any secondary changes and postural changes and improve functionality in genera. Physiotherapy should be aimed to ADL, so that the patient will have best starting point for returning back to normal life. Soft tissue techniques is also very

important in areas with a lot of the tightness and pain, it helps the tissues release tension and loosen up. (Lewit, 2009)

2.6.2 Cryotherapy

Cryotherapy is used for decreasing the temperature in a localized area. Decreasing pain by reducing nerve conduction velocity. It also reduces local inflammation because of vasoconstriction and slows down metabolism of the cells which reduces the need of nutrients and oxygen. (Alfonso, 2013)

2.6.3 Motor Splint Machine

The motor splint machine (MSM) is a machine that is used for controlled passive movements for the knee. It is a great tool to measure day to day range of motion because of its ability to show the degrees of the motion. This machine is often used every day in an post operative care.

2.6.4 Soft Tissue Techniques

The soft tissue techniques is important for the post operative therapy. For the patient it is a great way for improving mobility and elasticity. We can work with all layers after an examination, including the fasciae´s, the skin, and the subcutaneous layer. These layers will be stretched or shifted to the their barrier and hopefully release their tension after some time while holding with the same pressure on this point of barrier. This technique is important because all the body´s layers is connected, so if there is restriction in one layer, it can affect others too. (Lewit, 2009)

2.6.5 Post isometric relaxation

This is a technique that is used for relaxing tense and painful muscles and is excellent after a major operation like total knee replacement. The muscles we want to relax is placed in its most stretched position, there is our starting point. We will then ask the patient to hold against our applied resistance, important detail is not to push, but hold, this is because the contraction applied should be isometric. While we do this we will tell the patient to breath in and hold for some seconds, until we release the resistance and the patient relaxes and breathes out. The result we want to see is that the muscle relaxes. (Lewit, 2009)

2.6.6 Joint play

Joint play mobilization is helpful for pain and restrictions after a total knee replacement.

The goal of joint play mobilization is to mobilize blocked joint so that they unblock and can move as normal. The mobilizations can be applied in all directions (dorsal, ventral, caudal and cranially). (Lewit, 2009)

2.6.7 Strenghtening exercises

Strengthening exercises after a total knee replacement is very important to the patient for returning back to a normal life. The muscles targeted is all of the lower extremity muscles, with emphasis on those inserted into the knee joint (quadriceps femoris especially). The goal is to get back the strength that is lost because of the operation, and to improve functionality and stability.
The strengthening will also have a positive effect on the posture and for the gait. We have two different types of contracting muscles; isometric and isotonic. Isotonic can further be divided into eccentric and concentric contraction. Isometric is when you hold the same angel of a joint and the same length of a muscle while contracting. concentric contraction is shortening of a join angle and a muscle, and eccentric contraction is the opposite. (Higgins, 2011)

2.6.8 Stretching exercises

Stretching exercises is important for keeping the flexibility and the range of motion of the joints. Stretching means elongating the distance between two joints and by that stretching the muscles in-between. The stretching will increase the blood flow to the muscles and make them work more efficient, and it is also a good way to prevent other injuries. It will also help the patient be more mobile in the daily activities. (Anderson, 2010)

2.6.9 Sensomotoric Training

Sensomotoric training is focused on coordination while keeping an upright posture, it includes reacting with fast sequenced movements to new, unexpected impulses. We use tools like balance boards, balance shoes, mini-trampolines, gymnastic ball and bozu balls, we can also work without any equipment and do lunges both forward and backwards and one leg stance . This will improve the deep stabilizing system and promote better balance. Better balance will result in less risk of falling and less risk of fractures. Indications for sensomotoric training can be poorly coordinated muscles, instability and poor balance. (Becker, 2008)

2.6.10 Biolamp

We use biolamp after a total knee replacement because of its regeneration effect on soft tissues, removing hematoma, healing effect on the scar and on the bones. Biolamp can be used in a lot of different cases, e.g. acute and chronic pain, rheumatism, arthritis, degenerative conditions, muscle and tendon injuries, tennis elbow, swelling, acute and chronic inflammation, to mention some. Biolamp is coherent and polarized and it is polychromatic without the UV part with wave length of 430- 2800 nm. It penetrates between 1-2,5 cm into the tissues. (Kolář, 2013)

2.6.11 Pharmacotherapy

The goal for pharmacotherapy after a total knee replacement is pain management and decrease pain and also to prevent inflammation and deep vein thrombosis. It is mostly anti-inflammatory drugs, analgesics and anticoagulants that is used. Blood clots is common after a total knee replacement, therefor the use of anticoagulants is important. Infections is also another complication that can occur after this type of operation, therefor the use of antibiotics and NSAID´S (non-steroidal anti-inflammatory drugs) is used. NSAID´S is also helpful for pain and swellings.
It is important to be careful with the use of medication due to the risk of kidney problems and stomach bleeding. (Kennon, 2008).

3. special part

3.1 Methodology

My bachelor practice took place from 05.01-23.01.2015 at Revmatologický ústav clinic in Prague, Czech Republic. Revmatologický ústav is a medical faculty, an institute and a hospital for rheumatology diseases that give complete health care for both inpatients and outpatients.

My patient had the diagnosis psoriatic arthritis with osteoarthritis of knee and had a total knee replacement in early january, 7 days before I came to the hospital. My practice took place in the physiotherapy department of the hospital. There was four treatment beds in the room where I did my practice with all kinds of therapeutic tools including different kinds of balance boards, medicine balls, bozu balls, thera bands, wall bars and red cord.

The supervisor I had during my practice was Mgr. Maja Špiritović, and all of the examinations and therapeutical approaches I used were done in cooperation with her.

My patient was informed from the beginning, and the ethics committee of the faculty of physical education and sports at Charles University, Prague approved my work with the approval number 054/2015.

3.2. Anamnesis:

Examined person: O. J. Female

Year: 1957

Diagnosis: Total knee replacement of right knee, Psoriatic arthritis

Code: HLAB27

Status presents:

Height: 178cm

Weight: 97kg

BMI: 30,6 - Obese

She feels good, but she has pain around her right knee - Uses crutches

History of present problem:

She started to feel stiffness during the mornings in early 2010. in september 2010 she had an Rheumatologist testing her and got the diagnosis psoriatic arthritis.
Novemeber 2011 - RTG indicated knee osteoarthritis, which indicates TEP in right knee

05.01.2015
7 days after total knee replacement of the right knee.
She has a bandage over the scar.
She also were a bandage around her whole leg from the foot and up to her upper half of her right thigh.
Gonarthrosis - bilaterally (3 and 4 degree), Operation in right knee.
This is first hospitalization in ambulance - diagnosis Alloplastike totalis genus 1 dx 5 cc SVL
VAS (Visual Analogue Scale) - 3,4
Pain in the right knee, and in the lumbosacral area.
Edema/swelling around the knee.
She has trouble sleeping because of this pain.
The psoriatic arthritis is type symmetrical oligoarthritis and it is not painful.
She will begin the rehabilitation today and end it after two weeks.

Family Anamnesis:
Sister died of heart attack at the age of 54 in 2009
Husband died from liverstereosis March 2014.
Father died from lung cancer in colon in 1969.
Mother died 68 years old of tuberculosis (TBC), she also had diabetes 2.

Operation Anamnesis:
OP. 5.1.2015, no complications. 13.01 RHB start.
Plastic cervix of uterus in 2000. Hysterectomy in 2010
Arthroscopy of left knee in 1995

Gynecological anamnesis
Normal cycle until 2010, menopause.
Mamography - negative

Allergies:

Pencillin, pollen, dust, tobacco, intolarance ibalgin, PNC

Medications:

For PA. Salazoperine - immunosuppressors

Occupation Anamnesis:

Not working

Social Anamnesis:

Husband died in March 2014

Family: 2 children - One with Bronchial asthma.

Lives in a flat on the 2nd floor - uses elevator.

Hobbies:

Reading

Abuses:

Smoked cigarettes for 30 years until 2001.

No alcohol

Previous injuries:

Normal childhood diseases

Asthma from 2003.

Psariusa (skin disease)

Arterial hypertension since 2004

Hypercholesterolemic

Prior Rehabilitation:

For PA got medication - Immuno-suppressors .

Excerpt from patient's health care file:

N/A

RHB Indications:

Biolamp for hematoma, Cryotherapy for edema, strengthening of weak muscles, stretching of short muscles, PIR for adductors, hip flexors, hamstrings and triceps surae in the right leg. CPM (motor splint for increasing ROM in the right knee. Fascia (superficial and deep), skin and subskin therapy around the thigh and calf, lymph drainage in the thigh and calf.

Scar therapy

3.3. Initial Kinesiological Examination by physiotherapist:

13.01.2015

3.3.1. Antropometrical measurement

	sin.	dx.
Calves	42,5 cm	42,5 cm
Under patella	39,5 cm	42,5 cm
Around patella	42 cm	44,5 cm
Over patella	44 cm	47,5 cm
10 cm above patella	50 cm	47,5 cm
Around metatarsals	23,5 cm	23, 5
Ankles	23 cm	23 cm

Functional length (ASIS to medial mallelous)	96 cm	96 cm
Functional length (Umblicus to medial mallelous)	102 cm	102 cm
Anatomical length	92 cm	92 cm

Table 1. Initial examination, Antropometrical measurements

3.3.2. Aspection

She has a 20 cm long bandage over her scar on the right knee. There is edema/swelling in her right leg and hematomes on the upper half of the calf, on the posteromedial and posterolateral part of the knee and also posterolateral 10 cm above the knee.

Right knee is in semi flexion, restricted to extension.

3.3.3. Palpation

Muscles

Muscle	sin.	dx.
Biceps femoris	Normal tone	Hypotrophic, hypertone with trp
Semitendinotus	Normal tone	Hypotrophic, hypertone with trp
Semimembranosus	Normal tone	Hypotrophic, hypertone with trp
Rectus femoris	Normal tone	Hypotrophic, hypertone
Vastus medialis	Normal tone	Hypotrophic, hypertone
Vastus lateralis	Normal tone	Hypotrophic, hypertone
Vastus intermedius	Normal tone	Hypotrophic, hypertone with trp
Abductors hip	Normal tone	Hypotrophic, hypertone with trp
Adductors hip	Normal tone	Hypotrophic, hypertone with trp
Piriformis	Hypetone	Hypotrophic, hypertone with trp
Quadratus lumborum	Hypertone	Hypotrophic, hypertone with trp
Triceps surae	Normal tone	Hypotrophic, hypertone
Skin	No restrictions, normal temperature, normal color, no pain, no HAZ	20 cm long bandage over her scar, edema around the knee, hematomes on the upper half of the calf, on the posteromedial and posterolateral part of the knee and also posterolateral 10 cm above the knee. increased temperature around the knee. Pain caudally 5 cm from the knee.

Muscle	sin.	dx.
Subskin and fascia	No restrictions, no pain	Restrictions in both superficial and deep layers in the thigh and the calf.

Table 2. Initial examination, Palpation

3.3.4. Length test

(according Janda)

	sin.	dx.
Hip flexors one-joint muscles	0	2
Hip flexors two-joint muscles	0	2
Adductors	0	2
Hamstrings	0	2
Gastrocnemius	0	1

Table 3. Initial examination, Length test

3.3.5. Range of motion Examination

Active motions

	sin.	dx.
Ankle joint		
Eversion	20°	20°
Inversion	30°	30°
Dorsal flexion	20°	20°
Plantar flexion	40°	40°
Knee joint		
Flexion	120-30°	60°
Extension	0°	- 30°
Hip joint:		
Flexion	120°	100°
Extension	10°	10°
Abduction	45°	35°

Adduction	15°	10°
Internal rotation	30°	25°
External rotation	45°	45°
Metatarsophalangeal joint:		
Flexion	40°	40°
Extension	30°	30°
Interphalangeal joint:		
Flexion	40°	40°
Extension	50°	50°

Table 4. Initial examination, Range of motion

Passive motions

	sin.	dx.
Ankle joint:		
Eversion	25°	25°
Inversion	40°	40°
Dorsal flexion	30°	30°
Plantar flexion	45°	45°
Knee joint		
Flexion	130°	60°
Extension	0°	
Hip joint:		
Flexion	125°	110°
Extension	15°	15°
Abduction	50°	40°
Adduction	20°	15°
Internal rotation	35°	30°

External rotation	50°	50°
Metatarsophalangeal joint:		
Flexion	50°	50°
Extension	45°	45°
Internphalangeal joint:		
Flexion	50°	50°
Extension	55°	55°

Table 5. Initial examination ,Passive motion

3.3.6. Postural Examination

(With crutches. Without plumb line)

Posterior view

	sin.	dx.
Stance distance	Narrow	
Weight distribution	Putting more weight on the left leg, leaning over to the left.	
Achilles tendon	Valgocity	Valgocity
Calfs	Round	Bigger, edema
Knees	Valgocity	Valgocity, flexed
Popliteal line	Symetric	Symetric
Thighs	Round, hypertrophy	Round, hypothrophy
Gluteal line	Symetric	Symetric
Hip	Slight external rotation	External rotation
Waist width	Wide, higher	Lower
Lumbar spine	Neutral	
Thoracic spine	Neutral	
Shoulders	Elevated	Elevated
Cervical spine	Neutral	
Head	Neutral	

Table 6. Initial examination, Postural examination, posterior view

Lateral view

	sin.	dx.
Heels	Left heel is more forward than the right, which is back	
Lateral malleous	Visible	Slightly visibile
Knees	Hyperextended	semiflexion
Thighs	Round	Round
Shape of buttocks	Flat	Flat
Lumbar spine	Slight hyperlordosis	
Thoracic spine	Long kyphosis	
Shoulders	Protracted	Protracted
CTH- junction	Hyperkyphosis	
Cervical spine	Lordosis	
Head	Forward	

Table 7. Initial examination, Postural examination, Lateral view

Anterior view

	sin.	dx.
Stance distance	Narrow base	
Weight distribution	Putting more weight on the left leg, leaning over to the left.	
Longitudinal axis	Flat	Flat
Transverse axis	Flat	Flat
Ankles	Inverted	slight inverted
Knees	Valgocity	Valgocity
Umblicus	Shifted to the right	
Sternum	Midline	
Clavicles	Symmetrical	
Arms	Quiet far away from the body	
Shoulders	Elevated	Elevated
Head	Neutral	

Table 8. Initial examination, Postural examination, Anterior view

3.3.7. Pelvic Examination

ASIS	Right is higher
PSIS	Right is higher
Crest	Right is higher

Table 9. Initial examination, Pelvic examination

3.3.8. Gait Examination

- Walks with crutches
- Slow gait
- No pain
- Heel strike - rolls
- Small hip extension
- Puts more weight on left leg
- Slight knee adduction in left leg
- Short step length
- Keeps and upright position of head and spine
- Small motion in lumbar spine
- Small motion in thoracic spine
- Small motion in cervical spine
- Upper trunk rotates
- Lower trunk is stiff due to the crutches

3.3.9. Strength test:

(according Kendall)

	Grading:	
Muscle	sin.	dx.
Quadriceps femoris	5	3
Iliopsoas	5	4
Hamstrings	5	3
Gluteus maximus	5	4

	Grading:	
Muscle	sin.	dx.
Adductors	5	4
Abductors	5	5
Tibialis anterior	5	5
Triceps surae	5	5
Deltoid	5	5
Biceps brachii	5	5
Triceps brachii	5	5

Table 10. Initial examination, Strength test

3.3.10. Movement stereotypes

Hip extension:

Altered pattern on both legs:

1. Spinal extensors lumbar (kontra)
2. Spinal extensors lumbar (homo)
3. Gluteus maximus
4. Hamstrings
5. Spinal extensors thoracic (kontra)
6. Spinal extensors thoracic (homo)
7. Shoulder girdle

Hip abduction:

Altered pattern on both legs:

She does not have clean abduction, but with slight flexion and she also elevates her pelvis witch is a sign of overuse of quadratus lumborum

3.3.11. Neurological examination:

Higher function: Ok

Position sense: Ok

Sensations of dermatomes in lower extremity with light touch:

Dermatome	Sensation:	
	sin.	dx.
L2	Physiological	Physiological
L3	Physiological	Physiological
L4	Physiological	Physiological
L5	Physiological	Physiological
S1	Physiological	Physiological
S2	Physiological	Physiological

Table 11. Initial examination, examination of dermatomes

Deep tendon reflexes:

	Grading:	
	sin.	dx.
Patellar (L2-4)	2 normal	Not provided
Achilles (L5-S2)	2 normal	2 normal

Table 12. Initial examination, Deep tendon reflexes

Pain:

Dermatome	Sensation:	
	sin.	dx.
L2	No pain	No pain
L3	No pain	No pain
L4	No pain	Slight pain on knee part
L5	No pain	Slight pain on knee part
S1	No pain	Slight pain on knee part
S2	No pain	Slight pain on knee part

Table 13. Initial examination, Examination of pain

3.3.12. Joint play examination:

(according Lewit)

Joint		sin.	dx.
Patella		No blockage	Blocked all directions
Fibular		No blockage	No blockage
Subtalar		No blockage	No blockage
Talocural		No blockage	No blockage
Choparts		No blockage	No blockage
Lisfranc		No blockage	No blockage
MTP	1st	Blocked all directions	Blocked all directions
	2nd	Blocked all directions	Blocked all directions
	3rd	Blocked all directions	Blocked all directions
	4th	Blocked ventral/dorsal	Blocked all directions
	5th	Blocked all directions	Blocked all directions
PIP	1st	Blocked ventral/dorsal	Blocked ventral/dorsal
	2nd	Blocked ventral/dorsal	Blocked all directions
	3rd	Blocked ventral	Blocked ventral/dorsal
	4th	Blocked all directions	Blocked all directions
	5th	Blocked dorsal	Blocked ventral/dorsal
DIP	2nd	Blocked all directions	Blocked all directions
	3rd	Blocked all directions	Blocked all directions
	4th	Blocked all directions	Blocked all directions
	5th	Blocked all directions	Blocked all directions

Table 14. Initial examination, Joint play examination

Blocked metatarsals and distal interphalangeal (DIP) joints of both feet. Ok in the rest of the joints of the feet in both legs, ok knee joint in left leg (did not provide in right knee).

Examination's conclusion:

Antropometricial measurements

The measurements results shows us that there is difference between the operated leg and the healthy leg. The right leg is swollen, especially around the knee. The calves is symmetrical in circumference. Under, over and around the knee the right is bigger than the left, but when we move 10 cm above the patella the left is bigger. From this we can conclude that the swelling in the right leg stops, and the hypotrophy of the muscles start, and this makes up the difference. The lengths are symmetrical in both extremities.

Aspection

The aspection shows us mainly the 20 cm long bandage over the scar and the hematomes around the operated knee. They are located on the upper half of the calf, on the posteromedial and posterolateral part of the knee and also posterolateral 10 cm above the knee. The hematomes should be treated in case of internal hemorrhage. We can also tell that the right knee is semi flexed.

Palpation

The palpation of the muscles showed us that the right leg is hypotrophoic with hypertone, and with trigger points. The left leg is in normal tone.
Skin on right leg has increased temperature, there is pain from under the patella and caudally 5cm. Hematomes is shown on the upper half of the calf, on the posteromedial and posterolateral part of the knee and also posterolateral 10 cm above the knee. Left leg is physiological, no pain.
The subskin and fascia is physiological on the left leg, but in the right its restricted. Both the superficial deep layers is restricted in the thigh and calf.

Length test

The result from the length test was that the right leg has a lot of shortness in the muscles, especially the hip flexors which got the grading marked shortness. Hamstrings and adductors also had marked shortness. Gastrocnemius was not so bad, but there still was moderate shortness. The left leg was normal, no shortness.

Range of motion examination

The examination shows that there is decreased range of motion in the right leg compared to the left. As we can expect after a total knee replacement, there is restriction in range of motion into flexion, the right knee can only be flexed actively and passively 60°, which is normal after this type of operation. The extension is also restricted in the right leg, it can only go to -10°. This is something

which is important to work on during the therapy. To improve the range of motion so that the patient can perform all activities of daily living without problem. She also had restriction in hip flexion and abduction both passively and actively.

Postural examination

This examination gives us the information that the patient is clearly effected by the operation with her analgetic posture, she has a narrow base and leaning much over to the left side and to her crutches for compensating the pain in the right leg. This is important to correct during the therapy because this posture can result in secondary changes in the muscles , ligaments, tendons and joints, which we want to avoid.

The valgocity in both knees indicates that she has short hip adductors which we concluded with in the length test. Then we can also suspect elongated and weak antagonists, the abductors. Her lumbar spine has slight hyper lordotic curve, which can indicate weak abdominals, anteriorly tilted pelvis, weak hamstrings, and shortened hip flexors. Her thoracic spine has a long kyphosis, and then there is hyperkyphosis of CTH-junction and cervical lordosis. This can indicate elongated and weak neck flexors, and short neck extensors.

Pelvic examination

The result from this examination shows us that the right side is higher in all areas (ASIS, PSIS and Crests). This could be a result from analgesic posture, were the patient leans over to the left side for compensating for the pain, so that she is elevating the right pelvis.

Gait examination

First of all she is walking with crutches, and she does it quiet well, but she walks slowly with a short step length. She has no pain while walking which is very good. She is putting more weight on the left leg, this is because she is afraid. The lower trunk is stiff due to the crutches, her upper trunk rotates but the spine has small motion during the gait. There is also small hip extension in every step. Heel strike is quiet good with the heel landing first and then rolling over the whole foot, ending on the toes.

Strength test

She shows normal strength in the whole left extremity. The right leg is weak in the iliopsoas, quadriceps femoris, hamstrings, gluteus maximus and adductors. The quadriceps femoris and the hamstrings is the weakest with grading 3 on Kendalls scale. The abductors is normal, which

disproves the suggestion in the postural examination that the abductors were weak. The weakness is because of the surgery, and little activity for the last days. This will be one of the main focus in the therapy, to strengthen the weak muscles.

Movement stereotypes

There was altered movements in both of the stereotypes we tested, hip extension and hip flexion. During the hip extension the patient used to begin with, the contralateral spinal extensors in the lumbar area, second the homolateral spinal extensors in lumbar. The gluteus maximus is activated as the third part followed by the hamstrings and last the spinal extensors of throracic part, and shoulder girdle.

The hip abduction result is that she does not do the movement with clean abduction, but with slight flexion and elevation in the hip in both legs.

Neurological examination

Physiological in all dermatomes.

She has pain in the dermatomes L4, L5, S1 and S2 in the area of the right knee.

Deep tendon reflexes is also physiological on both legs

Joint play examination

All the MTP joints are blocked in all joints except the 4th digit on the left foot, which was only blocked ventrally and dorsally.

The PIP joints was also blocked, but mostly in the ventral/dorsal directions, except the 2nd and 4th right and the 4th left PIP which is blocked in all directions, the 3rd PIP of the left leg is blocked only ventrally and the 5th of the left leg is only blocked dorsally.

The DIP joints is blocked in all directions.

The patella of the operated leg was blocked in all directions.

3.4. Rehabilitation plan

3.4.1. Short-term physiotherapy plan

The main focus of the short term rehabilitation plan will be to decrease pain, reduce the edema/swelling, increase the range of motion, stretch short muscles, strengthen the weakened muscles and mobilize the blocked joints. The active range of motion in the knee should be up to 110° flexion, the extension should be 0° after a few weeks (1-6). The tense and short hip flexors, adductors and hamstrings should be stretched and relaxed.

Hip flexors, hip extensors and adductors of the right leg should be the main focus in the strengthening exercises, since these muscles groups was most effected after the operation. The blocked patella should be mobilized and also the blocked PIP, DIP and MTP joints. Re-educate the gait (stairs and normal), improve the stability and balance.

3.4.2. Long-term physiotherapy plan

Improve the patients functionality; increase strength, stability, balance, increase range of motion, all this to improve the general ADL function.

3.5 Therapy progress

Day to day therapy

1st day. 13.01.2015 - 7 days post OP

The goal of today's therapy unit:

- Reduce swelling
- DVT prevention
- Lymph node drainage
- Therapy for restricted soft tissues
- Decrease pain
- Increase ROM
- Relax thight muscles
- Strengthen weak muscles
- Instruct stairs gait
- Instruct self-therapy

Proposed therapy:

- Biolamp for hematomes
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph node drainage on the whole lower extremity with soft ball for edema
- Soft tissue techniques for fascia
- Post isometric relaxation for tight, hypertonic muscles

- Joint play mobilization of blocked joints in feet
- Strengthening of weak muscles
- Gait exercise in stairs

Implementation:

- Biolamp for 15 minutes for hematomes
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph drainage with soft ball and elevated leg, working from the caudal into the cranial direction for edema
- Soft tissue techniques for superficial and deep fascia in longitudinal axis of the calf and thigh
- PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
- Joint play for DIP and MTP and PIP joints of both feet and patella of the right knee
- Strengthening of weak muscles (iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus)

Iliopsoas exercise:
Supine position
Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:
Supine position
Concentric contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times
Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:
Supine position
flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)

Hamstrings and gluteus maximus exercise:

Prone position

Concentric contraction of hamstrings and gluteus maximus lying on the belly doing extension of the hip with the knee extended, lifting the whole leg up from the table for activation of hamstring muscles and gluteus maximus. Lower the leg back down to starting position - repeat 10 times

Concentric contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times

At the end of the session:

- CPM (Continous Passive Motion) with 0° extension and 90° flexion for 30 minutes
- Instructions on how to walk in stairs the proper way

Self-therapy:

- Instruct her to do the DVT prevention in her bed, 10 times every other hour.
- Instruct her to do isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 5 times a day.

Result:

Subjective:

She was able to do all the exercises proposed, without being scared, and she did not get any more pain. She had no problem walking the stairs with correct gait. The patient is positive and easy to work with.

Objective:

The tight and tense muscles was relaxed during the PIR exercises, and the she had good activation of the muscles during the strengthening exercises. Her blocked joints needs to be worked on more during the next days. The next days she will also need more biolamp for her hematomes, and CPM for her range of motion.

Day to day therapy

2nd day. 13.01.2015 - 8 days post OP

The goal of today's therapy unit:

- Reduce swelling

- DVT prevention
- Lymph node drainage
- Therapy for restricted soft tissues
- Increase ROM
- Stretching exercises for short muscles
- Mobilization of blocked joints
- Relax thight muscles
- Strengthen weak muscles
- Gait exercise in stairs

Proposed therapy:

- Biolamp for hematomes
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph node drainage on the whole lower extremity with soft ball for edema
- Soft tissue techniques for fascia
- Stretching exercises for hip flexors, hamstrings, gastrocnemius, adductors
- Post isometric relaxation for tight, hypertonic muscles
- Mobilization of blocked joints in feet
- Strengthening of weak muscles
- CPM for increasing ROM
- Gait exercise in stairs, walk up and down from the therapy session

Implementation:

- Biolamp for 15 minutes for hematomes
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention - 20 repetitions
- Lymph drainage with soft ball and elevated leg, working from the caudal into the cranial direction for the edema
- Soft tissue techniques for superficial and deep fascia in the longitudinal axis of calf and thigh
- Stretching exercise for the shortened muscles:

In supine position

- Lie on the far side of the treatment table, stretch the hip flexors by lying with the right extremity outside the bed, flex the left leg and use the left arm to hold the on the opposite side of the bed, so

that it stabilizes the body from not falling off. Let the right leg be stretched with the help of the gravity, hold for 30 seconds

- Stretch the hamstrings passively by lifting up the leg into maximum flexion, hold it for 30 seconds.
- Stretch the adductors of the hip passively by fixate the pelvis and do maximal abduction, hold for 30 seconds.

• PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
• Joint play for the blocked DIP, MTP and PIP joints of both feet and patella of the right knee
• Strengthening of weak muscles iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus:

Iliopsoas exercise:
Supine position
Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:
Supine position
Concentric contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times
Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:
Supine position
flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)

Hamstrings and gluteus maximus exercise:
Prone position
Concentric contraction of hamstrings and gluteus maximus lying on the belly doing extension of the hip with the knee extended, lifting the whole leg up from the table for activation of hamstring muscles and gluteus maximus. Lower the leg back down to starting position - repeat 10 times

Concentric contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times

At the end of the session:

- CPM (Continous Passive Motion) with -10° extension and 100° flexion for 30 minutes.

Self-therapy:

- DVT prevention in her bed, 10 times every other hour.
- Isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 5 times a day.

Result:

Subjective:

She was able to do all the exercises proposed, without being scared, and she did not get any pain. The stretching exercises was pleasant for her, and she felt that she got a good stretch in all the short muscles. Also we increased the CPM from 0° extension till -10° and 90° flexion till 100°, which indicates less edema restricting the range of motion.

The patient is positive.

Objective:

The tight and tense muscles was relaxed during the PIR exercises, and the she had good activation of the muscles during the strengthening exercises. The fascias is still restricted. And her hematomes is the same as yesterday, so more biolamp is needed. The edema was slightly reduced, and pain was almost not present.

Day to day therapy

3rd day. 15.01.2015 - 9 days post OP

Today the patient removed the stitches from the scar. Decreased range of motion into flexion in the knee after this.

The goal of today's therapy unit:

- Reduce swelling
- DVT prevention

- Therapy for restricted soft tissues
- Scar therapy
- Increase ROM
- Stretching exercises for short muscles
- Relax thight muscles
- Strengthen weak muscles
- Gait exercise in stairs
- Instruct more self-therapy

Proposed therapy:

- Biolamp for scar healing and hematomes
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph node drainage for swelling
- Soft tissue techniques for fascia
- Scar therapy with lotion
- Stretching exercises for hip flexors, hamstrings, gastrocnemius, adductors
- Post isometric relaxation for tight, hypertonic muscles
- Joint play mobilization of blocked joints in feet
- Strengthening of weak muscles
- CPM for increasing ROM
- Gait exercise in stairs, walk up and down from the therapy session

Implementation:

- Biolamp for 15 minutes for scar healing and hematomes
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph drainage with soft ball and elevated leg, working from the caudal into the cranial direction for the edema
- Soft tissue techniques for superficial and deep fascia in the longitudinal axis of calf and thigh
- Scar therapy with lotion, S-shape, C-shape, pressings, 10 times
- Stretching exercise for the shortened muscles:

In supine position

- Lie on the far side of the treatment table, stretch the hip flexors by lying with the right extremity outside the bed, flex the left leg and use the left arm to hold the on the opposite side of the bed, so that it stabilizes the body from not falling off. Let the right leg be stretched with the help of the gravity, hold for 30 seconds
- Stretch the hamstrings passively by lifting up the leg into maximum flexion, hold it for 30 seconds.
- Stretch the adductors of the hip passively by fixate the pelvis and do maximal abduction, hold for 30 seconds.

• PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
• Joint play for the blocked DIP, MTP and PIP joints of both feet and patella of the right knee
• Strengthening of weak muscles iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus.

Iliopsoas exercise:
Supine position
Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:
Supine position
Concentric contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times
Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:
Supine position
flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)

Hamstrings and gluteus maximus exercise:
Prone position

Concentric contraction of hamstrings and gluteus maximus lying on the belly doing extension of the hip with the knee extended, lifting the whole leg up from the table for activation of hamstring muscles and gluteus maximus. Lower the leg back down to starting position - repeat 10 times
Concentric contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times

At the end of the session:

- CPM (Continous Passive Motion) with 0° extension and 90° flexion for 30 minutes.

Self-therapy:

- DVT prevention in her bed, 10 times every other hour.
- Isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 10 repetitions 5 times a day.
- Isotonic contraction of the hamstrings - Bring the heel towards into the buttocks by sliding it on the bed, 10 repetitions 5 times a day.

Result:

Subjective:

The patient was able to do the exercises good, but she did have some pain during the therapy because the stitches were taken out. The range of motion was a bit decreased because of this. She activated her muscles during the strengthening exercises, but she was a bit afraid today.

Objective: It was expected that the it would be a bit more painful today, and that she was going to be a bit more afraid because the stitches were taken out. The scar looks healthy, she had some pain when given therapy to it in the far distal part and the proximal part, but no pain in the middle area. Her joint play is the same, but I was extra careful today at her patella because of the scar and her pain. She got instructions for self therapy for hamstrings today, but she was told that if she was afraid it was not necessary to provide it today.

Day to day therapy

4th day. 16.01.2015 - 10 days post OP

The goal of today's therapy unit:

- Reduce swelling
- DVT prevention
- Therapy for restricted soft tissues
- Scar therapy
- Increase ROM
- Stretching exercises for short muscles
- Relax thight muscles
- Strengthen weak muscles
- Gait exercise in stairs, walk up and down from the therapy session

Proposed therapy:

- Biolamp for scar healing and hematomes
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph node drainage
- Soft tissue techniques for fascia
- Scar therapy with lotion
- Stretching exercises for hip flexors, hamstrings, gastrocnemius, adductors
- Post isometric relaxation for tight, hypertonic muscles
- Joint play mobilization of blocked joints in feet
- Strengthening of weak muscles
- CPM for increasing ROM
- Gait exercise in stairs

Implementation:

- Biolamp for 15 minutes for scar healing and hematomes
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph drainage with soft ball and elevated leg, working from the caudal into the cranial direction for the edema
- Soft tissue techniques for superficial and deep fascia in the longitudinal axis of calf and thigh
- Scar therapy with lotion, S-shape, C-shape, pressings, 10 times
- Stretching exercise for the shortened muscles:

In supine position

- Lie on the far side of the treatment table, stretch the hip flexors by lying with the right extremity outside the bed, flex the left leg and use the left arm to hold the on the opposite side of the bed, so that it stabilizes the body from not falling off. Let the right leg be stretched with the help of the gravity, hold for 30 seconds
- Stretch the hamstrings passively by lifting up the leg into maximum flexion, hold it for 30 seconds.
- Stretch the adductors of the hip passively by fixate the pelvis and do maximal abduction, hold for 30 seconds.

• PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
• Joint play for the blocked DIP, MTP and PIP joints of both feet and patella of the right knee
• Strengthening of weak muscles iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus.

Iliopsoas exercise:
Supine position
Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:
Supine position
Concentric contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times
Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:
Supine position
flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)

Hamstrings and gluteus maximus exercise:
Prone position

Concentric contraction of hamstrings and gluteus maximus lying on the belly doing extension of the hip with the knee extended, lifting the whole leg up from the table for activation of hamstring muscles and gluteus maximus. Lower the leg back down to starting position - repeat 10 times
Concentric contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times

At the end of the session:

- CPM (Continous Passive Motion) with -10° extension and 100° flexion for 30 minutes.

Self-therapy:

- DVT prevention in her bed, 10 times every other hour.
- Isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 10 repetitions 5 times a day.
- Isotonic contraction of the hamstrings - Bring the heel towards into the buttocks by sliding it on the bed, 10 repetitions 5 times a day.

Result:

Subjective:

Today the patient was much better than yesterday, she did not have as much pain, and she was not so afraid. She feels that her strength is slowly increasing and that her range of motion is getting better.

Objective: She is positive today, not so stiff in her muscles, the PIR exercises working good for her. I was able to perform some more joint play in her patella today, which we could not do yesterday because of her pain.

Day to day therapy

5th day. 19.01.2015 - 13 days post OP

The goal of today's therapy unit:

- Reduce swelling
- DVT prevention
- Therapy for restricted soft tissues

- Scar therapy
- Increase ROM
- Stretching exercises for short muscles
- Relax thight muscles
- Strengthen weak muscles
- Gait exercise in stairs

Proposed therapy:

- Biolamp for hematomes and scar healing
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph node drainage for edema on the lower extremity.
- Soft tissue techniques for fascia
- Scar therapy with lotion
- Stretching exercises for hip flexors, hamstrings, gastrocnemius, adductors
- Post isometric relaxation for tight, hypertonic muscles
- Joint play mobilization of blocked joints in feet
- Strengthening of weak muscles
- CPM for increasing ROM
- Gait exercise in stairs, walk up and down from the therapy session

Implementation:

- Biolamp for 15 minutes for hematomes and scar healing
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Lymph drainage with soft ball and elevated leg, working from the caudal into the cranial direction for the edema
- Soft tissue techniques for superficial and deep fascia in the longitudinal axis of calf and thigh
- Scar therapy with lotion, S-shape, C-shape, pressings, 10 times
- Stretching exercise for the shortened muscles:

In supine position

- Lie on the far side of the treatment table, stretch the hip flexors by lying with the right extremity outside the bed, flex the left leg and use the left arm to hold the on the opposite side of the bed, so that it stabilizes the body from not falling off. Let the right leg be stretched with the help of the gravity, hold for 30 seconds

- Stretch the hamstrings passively by lifting up the leg into maximum flexion, hold it for 30 seconds.
- Stretch the adductors of the hip passively by fixate the pelvis and do maximal abduction, hold for 30 seconds.

• PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
• Joint play for the blocked DIP, MTP and PIP joints of both feet and patella of the right knee
• Strengthening of weak muscles iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus.

Iliopsoas exercise:
Supine position
Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:
Supine position
Concentric contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times
Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:
Supine position
flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)

Bridging:
Supine posititon
Flex both knees as much as possible (put a over-ball between the knees for stability if needed) arms pronated, lying along side the body on the table. Instruct the patient to lift up the whole hip and squeeze the gluteus maximus for great activation. Hold in top position for a second and then lower the hip back to the starting position on the table - repeat 10 times.

Hamstrings and gluteus maximus exercise:

Prone position

Concentric contraction of hamstrings and gluteus maximus lying on the belly doing extension of the hip with the knee extended, lifting the whole leg up from the table for activation of hamstring muscles and gluteus maximus. Lower the leg back down to starting position - repeat 10 times

Concentric contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times

At the end of the session:

- CPM (Continous Passive Motion) with -10° extension and 100° flexion for 30 minutes.
- Stairs training up to her room.

Self-therapy:

- DVT prevention in her bed, 10 times every other hour.
- Isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 10 repetitions 5 times a day.
- Isotonic contraction of the hamstrings - Bring the heel towards into the buttocks by sliding it on the bed, 10 repetitions 5 times a day.

Result:

Subjective:

She feels good. She has no pain today, so she was able to do the exercises well, both strengthening and stretching. Her gait in the stairs is very good, without any pain and without fear, but I still walk behind her for safety

Objective: Her hematomes is almost gone. Her scar looks healthy. The edema is reduced, and her strength is increased.

Day to day therapy

6th day. 20.01.2015 - 14 days post OP

The goal of today's therapy unit:

- Reduce swelling

- DVT prevention
- Therapy for restricted soft tissues
- Scar therapy
- Increase ROM
- Stretching exercises for short muscles
- Relax thight muscles
- Strengthen weak muscles
- Gait exercise in stairs

Proposed therapy:

- Biolamp for scar healing and hematomes
- Lymph node drainage for the whole lower extremity for edema
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Soft tissue techniques for fascia
- Scar therapy with lotion
- Stretching exercises for hip flexors, hamstrings, gastrocnemius, adductors
- Post isometric relaxation for tight, hypertonic muscles
- Joint play mobilization of blocked joints in feet
- Strengthening of weak muscles
- CPM for increasing ROM
- Gait exercise in stairs, walk up and down from the therapy session

Implementation:

- Biolamp for 15 minutes for hematomes and scar healing
- Lymph node drainage with soft ball and elevated leg, working from the caudal into the cranial direction for the edema
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Soft tissue techniques for superficial and deep fascia in the longitudinal axis of calf and thigh
- Scar therapy with lotion, S-shape, C-shape, pressings, 10 times
- Stretching exercise for the shortened muscles:

In supine position

- Lie on the far side of the treatment table, stretch the hip flexors by lying with the right extremity outside the bed, flex the left leg and use the left arm to hold the on the opposite side of the bed, so that it stabilizes the body from not falling off. Let the right leg be stretched with the help of the gravity, hold for 30 seconds
- Stretch the hamstrings passively by lifting up the leg into maximum flexion, hold it for 30 seconds.
- Stretch the adductors of the hip passively by fixate the pelvis and do maximal abduction, hold for 30 seconds.

• PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
• Joint play for the blocked DIP, MTP and PIP joints of both feet and patella of the right knee
• Strengthening of weak muscles iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus.

Iliopsoas exercise:
Supine position
Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:
Supine position
Concentric contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times
Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:
Supine position
flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)

Bridging:
Supine posititon

Flex both knees as much as possible (put a over-ball between the knees for stability if needed) arms pronated, lying along side the body on the table. Instruct the patient to lift up the whole hip and squeeze the gluteus maximus for great activation. Hold in top position for a second and then lower the hip back to the starting position on the table - repeat 10 times.

Hamstrings and gluteus maximus exercise:
Prone position
Concentric contraction of hamstrings and gluteus maximus lying on the belly doing extension of the hip with the knee extended, lifting the whole leg up from the table for activation of hamstring muscles and gluteus maximus. Lower the leg back down to starting position - repeat 10 times
Concentric contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times

At the end of the session:
- CPM (Continous Passive Motion) with -10° extension and 110° flexion for 30 minutes.
- Stairs training up to her room.

Self-therapy:
- DVT prevention in her bed, 10 times every other hour.
- Isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 10 repetitions 5 times a day.
- Isotonic contraction of the hamstrings - Bring the heel towards into the buttocks by sliding it on the bed, 10 repetitions 5 times a day.

Result:
Subjective:
No pain today as well, she feels good and is positive and in good mood. She feels that her strength is much better now, comparing to the first day. She feels that the PIR is very comfortable for her muscles, espcially the PIR for the hip flexors.

Objective: Today, the 6th day of therapy and the 14th day after the operation, we increased the CPM to 110° flexion, which indicates that her edema is reduced and range of motion increased. Her hematomes is completely gone, so from tomorrow, biolamp will be mainly for the scar healing. The

temperature differences from the right leg to the left are not so big anymore. Her strength is significantly better, and no pain. She sleeps well and eats well.

Day to day therapy

7th day. 21.01.2015 - 15 days post OP

The goal of today's therapy unit:

- Reduce swelling
- DVT prevention
- Therapy for restricted soft tissues
- Scar therapy
- Increase ROM
- Stretching exercises for short muscles
- Relax thight muscles
- Strengthen weak muscles
- Gait exercise in stairs

Proposed therapy:

- Biolamp for scar healing
- Lymph node drainage in the whole lower extremity for edema
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Soft tissue techniques for fascia
- Scar therapy with lotion
- Stretching exercises for hip flexors, hamstrings, gastrocnemius, adductors
- Post isometric relaxation for tight, hypertonic muscles
- Joint play mobilization of blocked joints in feet
- Strengthening of weak muscles
- CPM for increasing ROM
- Gait exercise in stairs, walk up and down from the therapy session

Implementation:

- Biolamp for 15 minutes for scar healing
- Lymph drainage with soft ball and elevated leg, working from the caudal into the cranial direction for the edema
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Soft tissue techniques for superficial and deep fascia in the longitudinal axis of calf and thigh
- Scar therapy with lotion, S-shape, C-shape, pressings, 10 times
- Stretching exercise for the shortened muscles:

In supine position

- Lie on the far side of the treatment table, stretch the hip flexors by lying with the right extremity outside the bed, flex the left leg and use the left arm to hold the on the opposite side of the bed, so that it stabilizes the body from not falling off. Let the right leg be stretched with the help of the gravity, hold for 30 seconds
- Stretch the hamstrings passively by lifting up the leg into maximum flexion, hold it for 30 seconds.
- Stretch the adductors of the hip passively by fixate the pelvis and do maximal abduction, hold for 30 seconds.

- PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
- Joint play for the blocked DIP, MTP and PIP joints of both feet and patella of the right knee
- Strengthening of weak muscles iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus.

Iliopsoas exercise:

Supine position

Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:

Supine position

Concentric contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times

Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:
Supine position
flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)
With the same position with the ball between the knees, lift one leg up to full extension and lower it back down for activation of quadriceps femoris - repeat 10 times.

Bridging:
Supine posititon
Flex both knees as much as possible (put a over-ball between the knees for stability if needed) arms pronated, lying along side the body on the table. Instruct the patient to lift up the whole hip and squeeze the gluteus maximus for great activation. Hold in top position for a second and then lower the hip back to the starting position on the table - repeat 10 times.

Hamstrings and gluteus maximus exercise:
Prone position
Concentric contraction of hamstrings and gluteus maximus lying on the belly doing extension of the hip with the knee extended, lifting the whole leg up from the table for activation of hamstring muscles and gluteus maximus, at the same time lift up the opposite extended arm for activation of paravertebrals and shoulder girdle. Lower the leg and arm back down to starting position - repeat 10 times
Concentric contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times.

At the end of the session:
- CPM (Continous Passive Motion) with -10° extension and 110° flexion for 30 minutes.
- Stairs training up to her room.

Self-therapy:
- DVT prevention in her bed, 10 times every other hour.

- Isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 10 repetitions 5 times a day.
- Isotonic contraction of the hamstrings - Bring the heel towards into the buttocks by sliding it on the bed, 10 repetitions 5 times a day.

Result:

Subjective: The patient is more confident now, her pain is gone, the strength is coming back, the range of motion is increasing every day, the edema is much better than it used to be, and she feels good in general.

Objective: We modified the hip extension and the adductor exercise so that she could challenge herself more. Since her strength is increasing she can do it without any problems and without pain. We can see some progress in joint play in her blocked patella and in the MTP, DIP and PIP.

Day to day therapy

8th day. 22.01.2015 - 16 days post OP

The goal of today's therapy unit:

- Reduce swelling
- DVT prevention
- Therapy for restricted soft tissues
- Scar therapy
- Increase ROM
- Stretching exercises for short muscles
- Relax thight muscles
- Strengthen weak muscles
- Gait exercise in stairs

Proposed therapy:

- Biolamp for scar healing
- Lymph node drainage for the whole lower extremity for the edema

- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Soft tissue techniques for fascia
- Scar therapy with lotion
- Stretching exercises for hip flexors, hamstrings, gastrocnemius, adductors
- Post isometric relaxation for tight, hypertonic muscles
- Joint play mobilization of blocked joints in feet
- Strengthening of weak muscles
- CPM for increasing ROM
- Gait exercise in stairs, walk up and down from the therapy session

Implementation:

- Biolamp for 15 minutes for scar healing
- Lymph node drainage with soft ball and elevated leg, working from the caudal into the cranial direction for the edema
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Soft tissue techniques for superficial and deep fascia in the longitudinal axis of calf and thigh
- Scar therapy with lotion, S-shape, C-shape, pressings, 10 times
- Stretching exercise for the shortened muscles:

In supine position

- Lie on the far side of the treatment table, stretch the hip flexors by lying with the right extremity outside the bed, flex the left leg and use the left arm to hold the on the opposite side of the bed, so that it stabilizes the body from not falling off. Let the right leg be stretched with the help of the gravity, hold for 30 seconds
- Stretch the hamstrings passively by lifting up the leg into maximum flexion, hold it for 30 seconds.
- Stretch the adductors of the hip passively by fixate the pelvis and do maximal abduction, hold for 30 seconds.

- PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
- Joint play for the blocked DIP, MTP and PIP joints of both feet and patella of the right knee
- Strengthening of weak muscles iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus.

Iliopsoas exercise:
Supine position
Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:
Supine position
Isotonic contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times
Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:
Supine position
flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)
With the same position with the ball between the knees, lift one leg up to full extension and lower it back down for activation of quadriceps femoris - repeat 10 times.

Bridging:
Supine posititon
Flex both knees as much as possible (put a over-ball between the knees for stability if needed) arms pronated, lying along side the body on the table. Instruct the patient to lift up the whole hip and squeeze the gluteus maximus for great activation. Hold in top position for a second and then lower the hip back to the starting position on the table - repeat 10 times.

Hamstrings and gluteus maximus exercise:
Prone position
Superman:
Isotonic contraction of hamstrings, gluteus maximus, paravertebrals and shoulder girdle, lying on the belly doing extension of the hip with the knees extended lifting both legs simultaneously up from the table and at the same time lift up both the arms into extension in the shoulder with

extended elbows also. This is for activation of hamstring muscles, gluteus maximus, paravertebrals and the shoulder girdle . Lower the legs and arms back down to starting position - repeat 10 times Isotonic contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times.

At the end of the session:

- CPM (Continous Passive Motion) with -10° extension and 105° flexion for 30 minutes.
- Stairs training up to her room.

Self-therapy:

- DVT prevention in her bed, 10 times every other hour.
- Isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 10 repetitions 5 times a day.
- Isotonic contraction of the hamstrings - Bring the heel towards into the buttocks by sliding it on the bed, 10 repetitions 5 times a day.

Result:

Subjective: The patient was complaining about one stitch on the distal part of the scar thats was not fully removed that she just discovered, so we removed it with a pin and placed a plaster over it. It was a little bit painful for her. Because of some the slight pain, we set the CPM back to 105° flexion instead of 110°, because she got the feeling that the scar was «opening» when she did too much flexion. The new modification of the hip extension exercise «superman» for hamstrings, gluteus maximus and paravertebrals was not a problem for her.

Objective:

She is a bit afraid today because of the removal of the stitch, but she still did all the therapy proposed, without pain for the most part, but we was a bit careful when providing flexion of the knee exercises.

Day to day therapy

9th day. 23.01.2015 - 17 days post OP

The goal of today's therapy unit:

- Reduce swelling
- DVT prevention
- Therapy for restricted soft tissues
- Scar therapy
- Increase ROM
- Stretching exercises for short muscles
- Relax thight muscles
- Strengthen weak muscles
- Gait exercise in stairs

Proposed therapy:

- Biolamp for scar healing
- Lymph node drainage in the whole lower extremity for edema
- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Soft tissue techniques for fascia
- Scar therapy with lotion
- Stretching exercises for hip flexors, hamstrings, gastrocnemius, adductors
- Post isometric relaxation for tight, hypertonic muscles
- Joint play mobilization of blocked joints in feet
- Strengthening of weak muscles
- CPM for increasing ROM
- Gait exercise in stairs, walk up and down from the therapy session

Implementation:

- Biolamp for 15 minutes for scar healing
- Lymph drainage with soft ball and elevated leg, working from the caudal into the cranial direction for the edema

- Dorsal/plantar flexion and circumduction in both directions in the ankles for deep vein thrombosis prevention
- Soft tissue techniques for superficial and deep fascia in the longitudinal axis of calf and thigh
- Scar therapy with lotion, S-shape, C-shape, pressings, 10 times
- Stretching exercise for the shortened muscles:

In supine position

- Lie on the far side of the treatment table, stretch the hip flexors by lying with the right extremity outside the bed, flex the left leg and use the left arm to hold the on the opposite side of the bed, so that it stabilizes the body from not falling off. Let the right leg be stretched with the help of the gravity, hold for 30 seconds
- Stretch the hamstrings passively by lifting up the leg into maximum flexion, hold it for 30 seconds.
- Stretch the adductors of the hip passively by fixate the pelvis and do maximal abduction, hold for 30 seconds.

- PIR for gastrocnemius, adductors, hamstrings, hip flexors, piriformis, quadratus lumborum, 5 times
- Joint play for the blocked DIP, MTP and PIP joints of both feet and patella of the right knee
- Strengthening of weak muscles iliopsoas, quadriceps femoris, adductors, hamstrings, gluteus maximus.

Iliopsoas exercise:

Supine position

Pronated arms along the table, left leg flexed, the right leg should be raised up from the table in a smooth motion, and then lowered down to the table - repeat 10 times.

Quadriceps femoris exercise:

Supine position

Isotonic contraction with an over-ball under the heel, roll the ball back and forth for activation of the quadriceps femoris - repeat 10 times

Isometric contraction with an over-ball under the knee, press the knee down towards the table for activation of quadriceps femoris - repeat 10 times

Adductors exercise:

Supine position

flex the knees to the maximum, with an over-ball between the knees, press the knees towards each other for activation of adductor muscles (adductor magnus, longus, brevis)
With the same position with the ball between the knees, lift one leg up to full extension and lower it back down for activation of quadriceps femoris - repeat 10 times.

Bridging:
Supine posititon
Flex both knees as much as possible (put a over-ball between the knees for stability if needed) arms pronated, lying along side the body on the table. Instruct the patient to lift up the whole hip and squeeze the gluteus maximus for great activation. Hold in top position for a second and then lower the hip back to the starting position on the table - repeat 10 times.

Hamstrings and gluteus maximus exercise:
Prone position
Superman:
Isotonic contraction of hamstrings, gluteus maximus, paravertebrals and shoulder girdle, lying on the belly doing extension of the hip with the knees extended lifting both legs simultaneously up from the table and at the same time lift up both the arms into extension in the shoulder with extended elbows also. This is for activation of hamstring muscles, gluteus maximus, paravertebrals and the shoulder girdle . Lower the legs and arms back down to starting position - repeat 10 times
Isotonic contraction of hamstrings and gluteus maximus - same as the exercise over, but with the knee flexed - repeat 10 times.

At the end of the session:
- CPM (Continous Passive Motion) with -10° extension and 110° flexion for 30 minutes.
- Stairs training up to her room.

Self-therapy:
- DVT prevention in her bed, 10 times every other hour.
- Isometric contraction of quadriceps femoris, with her pillow under the knee. pushing down against the bed, 10 repetitions 5 times a day.
- Isotonic contraction of the hamstrings - Bring the heel towards into the buttocks by sliding it on the bed, 10 repetitions 5 times a day.

Result:

Subjective: On this last therapy session she felt good, the pain from the stitch yesterday went away during the night, so she is happy about that. She feels that she progression in all of the exercises, especially the strengthening. The PIR is working well for her, and the her range of motion is increased.

Objective:

Her edema is reduced significantly, the joint play of the patella is better, her pain is away.

3.6. Final examination conclusion

Performed 23.01.2015

Changes are marked with the color red.

3.6.1. Antropometrical measurement:

	sin.	dx.
Calves	43 cm (+0,5 cm)	43 cm (+0,5 cm)
Under patella	40 cm (+0,5 cm)	42 cm (-0,5 cm)
Around patella	44 cm (+2 cm)	44 cm (-0,5 cm)
Over patella	44,5 cm (+0,5 cm)	47 cm (-0,5 cm)
10 cm above patella	50 cm	49 cm (+1,5 cm)
Around metatarsals	25 cm (+1,5 cm)	25 cm (+1,5 cm)
Ankles	23 cm	23 cm

Functional length (ASIS to medial mallelous)	96 cm	96 cm
Functional length (Umblicus to medial mallelous)	102 cm	102 cm
Anatomical length	92 cm	92 cm

Table 15. Final examination, Antropometrical measurement

3.6.2 Aspection:

The scar looks good, she has a plaster on the lowest part because there was one stitch that was not completely removed, so a doctor needed to remove it and then applied the plaster. Hematomes are almost completely gone. Still slight edema in the calves of right leg and around the knee.
Right knee is still in some flexion, restricted to extension.

3.6.3. Palpation

Muscles

Muscle	sin.	dx.
Biceps femoris	Normal tone	Hypotrophic, hypertone
Semitendinotus	Normal tone	Hypotrophic, hypertone
Semimembranosus	Normal tone	Hypotrophic, hypertone
Rectus femoris	Normal tone	Hypotrophic, hypertone
Vastus medialis	Normal tone	Hypotrophic, hypertone
Vastus lateralis	Normal tone	Hypotrophic, hypertone
Vastus intermedius	Normal tone	Hypotrophic, hypertone with trp
Abductors hip	Normal tone	Hypotrophic, hypertone with trp
Adductors hip	Normal tone	Hypotrophic, hypertone with trp
Piriformis	Hypetone	Hypotrophic, hypertone with trp
Quadratus lumborum	Hypertone	Hypotrophic, hypertone with trp
Triceps surae	Normal tone	Hypotrophic, hypertone
Skin	No restrictions, normal temperature, normal color, no pain, no HAZ	2 cm long plaster over the lowest part of the scar, almost no edema around the knee, marked reduction of hematomes. Normal temperature around the knee. No pain.

Muscle	sin.	dx.
Subskin and fascia	No restrictions, no pain	Decreased restrictions in both superficial and deep layers in the thigh and the calf.

Table 16. Final examination, Palpation

3.6.4. Length test

(according Janda)

	sin.	dx.
Hip flexors one-joint muscles	0	1
Hip flexors two-joint muscles	0	1
Adductors	0	1
Hamstrings	0	2
Gastrocnemius	0	1

Table 17. Final examination, Length test

3.6.5. Range of motion Examination

Active motions

	sin.	dx.
Ankle joint		
Eversion	20°	20°
Inversion	30°	30°
Dorsal flexion	20°	20°
Plantar flexion	40°	40°
Knee joint		
Flexion	120-30°	90°
Extension	0°	0°
Hip joint:		
Flexion	120°	110°
Extension	10°	10°

Abduction	45°	40°
Adduction	15°	10°
Internal rotation	30°	30°
External rotation	45°	45°
Metatarsophalangeal joint:		
Flexion	40°	40°
Extension	30°	30°
Interphalangeal joint:		
Flexion	40°	40°
Extension	50°	50°

Table 18. Final examination, Range of motion, Active

Passive motions

	sin.	dx.
Ankle joint:		
Eversion	25°	25°
Inversion	40°	40°
Dorsal flexion	30°	30°
Plantar flexion	45°	45°
Knee joint		
Flexion	130°	90°
Extension	0°	0°
Hip joint:		
Flexion	125°	120°
Extension	15°	15°
Abduction	50°	45°
Adduction	20°	15°
Internal rotation	35°	30°
External rotation	50°	50°
Metatarsophalangeal joint:		
Flexion	50°	50°

Extension	45°	45°
Internphalangeal joint:		
Flexion	50°	50°
Extension	55°	55°

Table 19. Final examination, Range of motion, Passive

3.6.6 Postural Examination

(With crutches. Without plumb line)

Posterior view

	sin.	dx.
Stance distance	Narrow	
Weight distribution	Putting more weight on the left leg, leaning over to the left.	
Achilles tendon	Valgocity	Valgocity
Calfs	Round	Round
Knees	Valgocity	Valgocity, slightly flexed
Popliteal line	Symetric	Symetric
Thighs	Round, hypertrophy	Round, hypothrophy
Gluteal line	Symetric	Symetric
Hip	Slight external rotation	External rotation
Waist width	Wide, higher	Lower
Lumbar spine	Neutral	
Thoracic spine	Neutral	
Shoulders	Elevated	Elevated
Cervical spine	Neutral	
Head	Neutral	

Table 20. Final examination, Postural examination, posterior view

Lateral view

	sin.	dx.

	sin.	dx.
Heels	Left heel is more forward than the right, which is back	
Lateral malleous	Visible	Visible
Knees	Hyperextended	Slight flexion
Thighs	Round	Round
Shape of buttocks	Flat	Flat
Lumbar spine	Lordosis	
Thoracic spine	Long kyphosis	
Shoulders	Protracted	Protracted
CTH- junction	Hyperkyphosis	
Cervical spine	Lordosis	
Head	Forward	

Table 21. Final examination, postural examination, lateral view

Anterior view

	sin.	dx.
Stance distance	Narrow base	
Weight distribution	Putting more weight on the left leg, leaning over to the left.	
Longitudinal axis	Flat	Flat
Transverse axis	Flat	Flat
Ankles	Inverted	slight inverted
Knees	Valgocity	Valgocity
Umblicus	Shifted to the right	
Sternum	Midline	
Clavicles	Symmetrical	
Arms	Quiet far away from the body	
Shoulders	Elevated	Elevated
Head	Neutral	

Table 22. Final examination, postural examination, anterior view

3.6.7 Pelvic Examination

ASIS	Right is higher
PSIS	Right is higher
Crest	Right is higher

Table 23. Final examination, Pelvic examination

3.6.8 Gait Examination

- Walks with crutches
- Slow gait, but faster than initial examination
- No pain
- Heel strike - rolls
- Small hip extension
- Puts more weight on left leg - not as much as on the initial examination
- Slight knee adduction in left leg
- Short step length
- Keeps and upright position of head and spine
- Small motion in the spine
- Upper trunk rotates
- Lower trunk is stiff due to the crutches

3.6.9 Strength test:

(according Kendall)

	Grading:	
Muscle	sin.	dx.
Quadriceps femoris	5	4
Iliopsoas	5	5
Hamstrings	5	4
Gluteus maximus	5	4
Adductors	5	4
Abductors	5	5
Tibialis anterior	5	5
Triceps surae	5	5
Deltoid	5	5

	Grading:	
Muscle	sin.	dx.
Biceps brachii	5	5
Triceps brachii	5	5

Table 24. Final examination, Strength test

3.6.10. Movement stereotypes

Hip extension:

Altered pattern on both legs:

1. Spinal extensors lumbar (kontra)
2. Spinal extensors lumbar (homo)
3. Gluteus maximus
4. Hamstrings
5. Spinal extensors thoracic (kontra)
6. Spinal extensors thoracic (homo)
7. Shoulder girdle

Hip abduction:

Altered pattern on both legs:

She does not have clean abduction, but with slight flexion and she also elevates her pelvis witch is a sign of overuse of quadratus lumborum.

3.3.12. Neurological examination:

Higher function: Ok

Position sense: Ok

Sensations of dermatomes in lower extremity with light touch:

Dermatome	Sensation:	
	sin.	dx.
L2	Physiological	Physiological
L3	Physiological	Physiological
L4	Physiological	Physiological
L5	Physiological	Physiological
S1	Physiological	Physiological

Dermatome	Sensation:	
S2	Physiological	Physiological

Table 25. Final examination, examination of dermatomes

Deep tendon reflexes:

	Grading:	
	sin.	dx.
Patellar (L2-4)	2 normal	Not provided
Achilles (L5-S2)	2 normal	2 normal

Table 26. Final examination, Deep tendon reflexes

Pain:

Dermatome	Sensation:	
	sin.	dx.
L2	No pain	No pain
L3	No pain	No pain
L4	No pain	No pain
L5	No pain	No pain
S1	No pain	Slight pain on knee part
S2	No pain	Slight pain on knee part

Table 27. Final examination, examination of pain

3.3.13. Joint play examination:

(according Lewit)

Joint		sin.	dx.
Patella		No blockage	Blocked all directions
Fibular		No blockage	No blockage
Subtalar		No blockage	No blockage
Talocural		No blockage	No blockage
Choparts		No blockage	No blockage

Joint		sin.	dx.
Lisfranc		No blockage	No blockage
MTP	1st	Blocked all directions	Blocked all directions
	2nd	Blocked all directions	Blocked all directions
	3rd	Blocked all directions	Blocked all directions
	4th	Blocked ventral/dorsal	Blocked all directions
	5th	Blocked all directions	Blocked all directions
PIP	1st	Blocked ventral/dorsal	Blocked ventral/dorsal
	2nd	Blocked ventral/dorsal	Blocked all directions
	3rd	Blocked ventral	Blocked ventral/dorsal
	4th	Blocked all directions	Blocked all directions
	5th	Blocked dorsal	Blocked ventral/dorsal
DIP	2nd	Blocked all directions	Blocked all directions
	3rd	Blocked all directions	Blocked all directions
	4th	Blocked all directions	Blocked all directions
	5th	Blocked all directions	Blocked all directions

Table 28. Final examination, Joint play

Blocked metatarsals and distal interphalangeal (DIP) joints of both feet. (grade 4?) ok in the rest of the joints of the feet in both legs, ok knee joint in left leg (did not provide in right knee).

3.4 Conclusion of final kinesiologic examination.

Antropometricial measurements

The final measurements shows that there is still some difference between the operated leg and the healthy leg. The right leg is not as swollen as before. The calves is symmetrical in circumference, increased by 0,5 cm on both legs. Under and over the knee the right is bigger than the left, but we can see a reduction of 0,5 cm from before. Around the patella there is now no difference between right and left after 0,5 cm reduction in the right and + 2 cm on the left. When we move 10 cm above the patella the left just slightly bigger since the circumduction of the right thigh is increased by 1,5 cm. This can indicate that the previously hypotrophic muscles in the right leg is now less hypotrophic. The lengths are symmetrical in both extremities.

Aspection

The final aspection shows that the scar is looking good, with a small plaster on the distal part, because of a stitch that was removed later than the others. the hematomes around the operated knee is almost gone. no other abnormal coloring.

Right knee is not semi flexed anymore. This shows us that the extension ROM is increased.

Palpation

The palpation of the muscles showed us that the right leg is hypotrophic with hypertone, and with trigger points, but the trigger points in the hamstrings is not so prominent anymore. The left leg is in normal tone.

Skin on right leg now normal temperature, there is no pain. Left leg is physiological, no pain.

The subskin and fascia (+ deep fascia) is less restricted than before on the right leg. And on the left is still physiological.

Length test

The final results from the length test shows that the right leg is now not as short as from the initial examination, especially in in the one-joint and two-joint hip flexors, and the adductors. Hamstrings is still grading 2, marked shortness. Gastrocnemius is still grading 1, moderate shortness. The left leg was normal, no shortness.

Range of motion examination

The final examination shows that there is increased ROM in active motions in internal rotation and abduction of the hip by 5° on the operated leg, also flexion is increased by 10°. The biggest improvements was found in the flexion and extension of the knee joint, which was increased by 30° in both directions. The active ROM in the left leg was not changed. On the passive testing the flexion in the right knee was increased by 30°. The flexion in the hip joint was increased by 10° and abduction was increased by 5°. No differences in the left leg.

This general improvement in ROM helps the patient deal with activities of daily living with much more ease, which was one of the goals of the therapy.

Postural examination

Posterior view final result: We can see an improvement in the calfs, where now there is not as big edema as the initial examination. The right knee also seems less flexed.n

Lateral view final result: The results here shows that the lateral malleos of the right knee is visible now, in the initial examination it was only just visible. We can see that the right knee is slightly flexed, which is an improvement. The lumbar lordosis also reduced.
Anterior view final result: There is no significant difference from the initial examination.
The analgetic posture is a bit better, in a way that she does not look like she is in pain anymore. The base is still narrow, but she is not leaning as much to the left side as we saw on the initial examination. With that information we can conclude that she is not in pain and is more confident and not as scared as earlier.

Pelvic examination

The final results of the pelvic examination gives us the information that there is no noticeable changes in the pelvis.

Gait examination

(with crutches)
The gait is faster than from the initial examination, but still quiet slow. She has no pain when walking. The heel strike is still the same with a good roll. The hip extension is small as from before. And the weight bearing is a bit equalized, but we can still see that she puts more weight on the left leg. The trunk is stiff, with small motion in the spine.

Strength test

The left leg is normal. The right leg has increased in strength in quadriceps femoris, iliopsoas and hamstrings. The iliopsoas is now normal and the quadriceps femoris, and hamstrings is a 4 on the Kendalls scale. The gluteus maximus is still 4, and so is the adductors. The rest is normal (Tibialis anterior, abductors, triceps surae, deltoid, biceps brachii and triceps brachii)

Movement stereotypes

Still altered pattern in both hip adduction and hip extension. The gluteus maximus and hamstrings is activated after the contralateral and homolateral spinal extensors of the lumbar spine.
She continues to do hip abduction with slight flexion and elevation of the hip.

Neurological examination

Physiological in all dermatomes.

She has slight pain in the dermatomes S1 and S2 in the area of the right knee.
Deep tendon reflexes - physiological on both legs

Joint play examination

The final joint play examination shows us no significant differences from the initial examination. The patella of the operated leg is still blocked. Left has no blockage. The MTP joints are all blocked except the 4th digit on the left foot. PIP joints was also blocked, but still mostly in the ventral/dorsal directions. DIP was blocked in all directions of both feet.

The results above shows us that the therapy given to the patient was beneficial and had a good effect. The right leg is stronger, more flexible, and not painful. The hip flexors has increased in ROM due to the PIR and stretching, which made the muscles relax and elongate. The ROM has also increased remarkably in flexion and extension of the right knee. These improvements in ROM will help the patient a lot in her daily activities, as we clearly could see in stair climbing, were she now is much more stable and fluently in her motion. This is also due to the increased strength in her leg. She increased strength in the quadriceps femoris and hamstrings of the right leg which is important in the rehabilitation, this has also had an positive effect on her posture and gait. She is also more confident and not scared for walking a bit faster. The antropometrical measurements shows us that the edema was decreased in the right leg. The soft tissues of the right leg is also less restricted than before and the high temperature around the operated knee is decreased.
The patient was positive and cooperative to all the exercises given to her, which made it easy to work with her. She was really motivated almost every day which is crucial for a successful therapy session. During the strengthening exercises she was working hard on each repetition and she was not afraid to break a sweat when she trained, which is why we saw great strength increase on the final examinations. The hamstrings is still marked short, which I was hoping that we could´ve improved. The joint play did not show a lot of improvement, but other than this I think the rehabilitation was a success. The range of motion increase is very good and so is the regained strength.

4. Conclusion

I arrived at the hospital on the 7th day after my patient´s total knee replacement. My patient was given to me, I didn't have any other choice in different patients I could have, but it was really no problem. My patient was very kind and positive. She was helpful, and did gladly help me with everything I needed to write my thesis. When I came there she had bandage and plaster over her

scar, she had big edema, a lot of hematomes, almost no range of motion in her operated knee. But after the nine sessions that we had together she improved a lot, we could see progression and results almost every day. The range of motion in the right leg increased which is one of the most important goals after a total knee replacement. She is now able to walk up and down the stairs with her crutches with no problem. Her ADL will be much easier for her now after the operation and rehabilitation because her coordination, stability and motor skills is improved, but also because her pain is gone. The pain she had before the operation had a big influence on her in her daily life, but she thinks now after the operation everything will be much better. Her motivation, cooperation and kindness made it very easy for me to provide any kind therapy or exercises, even when our oral communication failed, body language helped out and made it fun. Her regained confidence will also help in the activities of daily living. She is no longer scared of doing things that she previously was afraid of doing. Her posture is good example of this. She does no longer have that clear dominating analgesic posture. This is also because of her increased strength and stability. She specifically liked the PIR exercises we did. They made her relax her muscles that she felt was tight. Some exercises she had some difficulties performing and some were to easy so that we had to modify them to make it more challenging. The therapy was successful in the way that she had progression every day and because she felt better every day, which is just as important if you ask me.

I have collected information about total knee replacement, the knee itself and about the disease psoriatic arthritis, but the best part was to actually have the practice and work with the patient. It was very inspiring to have such a positive and motivated patient who made it very easy for me to work with her.

I think the prognosis of my patient is good. Mainly because of her motivation and positive being. When she is fully back to normal ADL is up to her, but I don't think it will take long. Hopefully she will have this new knee that she can use much more than the old one for several years.

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6 Supplement

6.1. List of tables

6.1 Etics board committee documentation

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Application for Ethics Board Review

of the research project, doctoral research, master degree research, undergraduate research, involving human subjects

Project title: Case study of a patient with the diagnosis of psoriatic arthritis after total knee replacement

Nature of the research project: Bachelor's Thesis

Author (chief investigator): Tor-Erik W. Stiksrud

Supervisor (in case of student research): Doc. PaedDr. Dagmar Pavlu, CSc.

Research project description Case study of physiotherapy treatment of a patient with the diagnosis of psoriatic arthritis after total knee replacement will be conducted under the expert supervision of an experienced physiotherapist at Revmatologicky Ustav.

Guaranteed safety to be judged by experts: rationale for the use of invasive methodologies, procedures minimizing the risk to subjects

Ethical aspects of the research: special rationale for research involving children, pregnant and nursing women, mentally disabled, prisoners and persons in underdeveloped communities (see the Ethics Board Code, Faculty of Physical Education and Sport, Charles University, and International Ethical Guidelines 5, 6, 7, 8 and 11)

Informed consent (attached)

Date: 18.2.2015 Author's signature: Tor-Erik Stiksrud

Faculty of Physical Education and Sport, Charles University in Prague
ETHICS BOARD REVIEW

Ethics Board members: Prof. Ing. Václav Bunc, CSc.
Prof. PhDr. Pavel Slepička, DrSc.
Doc. MUDr. Jan Heller, CSc.

The Ethics Board at the Faculty of Physical Education and Sport, Charles University, approved the research project.

Approval number: 054/2015

Date: 19.2.2015

The Ethics Board at the Faculty of Physical Education and Sport, Charles University, reviewed the submitted research project and **found no contradictions with valid principles**, regulations and international guidelines for biomedical research involving human subjects.

The chief investigator of the project met the necessary requirements for receiving the Ethics Board approval.

UNIVERZITA KARLOVA v Praze
Fakulta tělesné výchovy a sportu
José Martího 31, 162 52, Praha 6
1

Official school stamp

Signature, REB Chairman

6.2 Informed consent form

INFORMOVANÝ SOUHLAS

V souladu se Zákonem o péci o zdraví lidu (§ 23 odst. 2 zákona c.20/1966 Sb.) a Úmluvou o lidských právech a biomedicíne c. 96/2001, Vás žádám o souhlas
k vyšetrení a následné terapii. Dále Vás žádám o souhlas k nahlížení do Vaší dokumentace osobou získávající zpusobilost k výkonu zdravotnického povolání v rámci praktické výuky a s uverejnením výsledku terapie v rámci bakalárské práce na FTVS UK. Osobní data v této studii nebudou uvedena.

Dnešního dne jsem byla odborným pracovníkem poucena o plánovaném vyšetrení a následné terapii. Prohlašuji a svým dále uvedeným vlastnorucním podpisem potvrzuji, že odborný pracovník, který mi poskytl poucení, mi osobne vysvetlil vše, co je obsahem tohoto písemného informovaného souhlasu, a mela jsem možnost klást mu otázky, na které mi rádne odpovedel.

Prohlašuji, že jsem shora uvedenému poucení plne porozumela a výslovne souhlasím s provedením vyšetrení a následnou terapií. Souhlasím s nahlížením níže jmenované osoby do mé dokumentace a s uverejnením výsledku terapie v rámci studie.

Datum:.....

Osoba, která provedla poucení:..... Podpis osoby, která provedla poucení:..... Vlastnorucní podpis pacienta /tky:.....